4.4/9 a) $\cos^{-1}(\cos(x)) = x$

True for . . .

$[0, \pi]$

x

$\downarrow$

$\mathbb{R} \to \cos x$

$\downarrow$

$[-1, 1] \to \cos^{-1}(x)$

$\downarrow$

$[0, \pi]$

b) $\cos(\cos^{-1}(x)) = x$

$x \to \cos^{-1}(x) \to \cos \to x$

$[-1, 1]$

angle

$\cos\theta$?

$\to .3742$

$[-1, 1]$

$\to .3742$

$\cos^{-1}(.3742) = \theta$

$\cos(\theta) = .3742$

4.4/9c) $\tan^{-1}(\tan x) = x$

for: $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

~~$\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$~~

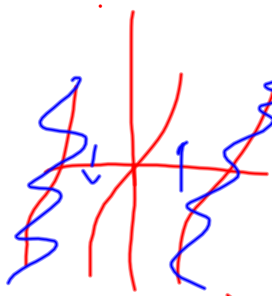
x

$\downarrow$

$\tan x \to (-\infty, \infty)$

$\downarrow$

$\tan^{-1} x \to \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$



$\tan x = \frac{\sin x}{\cos x}$

$\neq 0$

$\cos x = 0$

when $x = \frac{\pi}{2} \pm n\pi$

$\mathbb{R}$

9d) θ whose tan is in $\mathbb{R}$

$\tan(\tan^{-1}(x)) = x$

for: $\mathbb{R}$

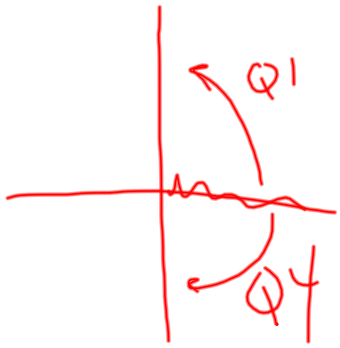
sin "think y" −

cos "think x" +

13 a) $\theta \in Q1$

$$\cos(\tan^{-1}(x)) = \frac{1}{\sqrt{x^2+1}}$$

$$\cos(\theta \text{ where } \tan\theta = x) =$$



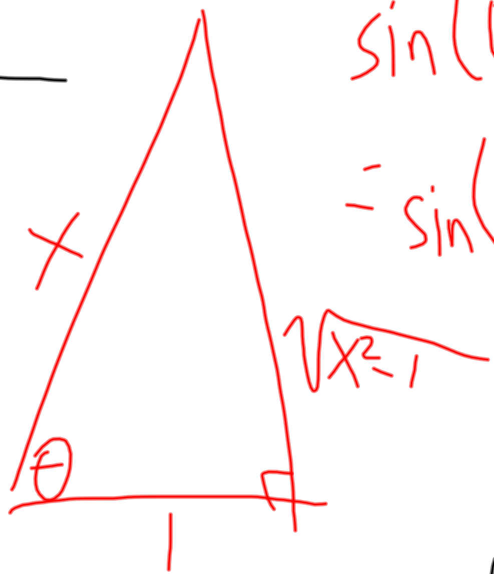
4.4/13 c

$$\sin(\sec^{-1}(x)) = ?$$

$$\sin(\theta \text{ where } \sec\theta = x)$$

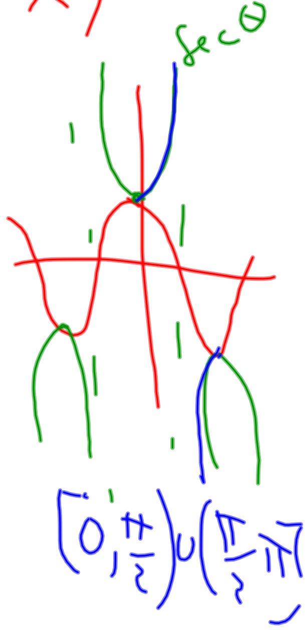
$$= \sin\left(\theta \text{ where } \cos\theta = \frac{1}{x}\right)$$

$$\frac{1}{\cos\theta} = x$$
$$1 = \cos\theta \cdot x$$
$$\frac{1}{x} = \cos\theta$$



$$= \frac{\sqrt{x^2-1}}{|x|}$$

because sin(y value) in Q2 is +



7a) $\sin^{-1}\left(\sin\left(\frac{\pi}{7}\right)\right)$

$\left(-\frac{\pi}{2} \quad \frac{-\pi}{7} \; (Q4)\right)$

$\sin\left(\frac{\pi}{7}\right) = +\sim$

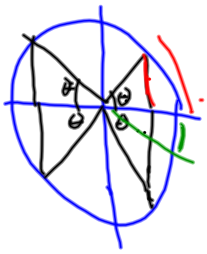
$\downarrow$ Q1

$\sin^{-1}(+\sim) =$
angle whose sine is $+\sim$

$= \frac{\pi}{7} \pm \sim$

Q1, Q4

$\underbrace{\text{but } \frac{\pi}{7} \text{ is in Q1 so it works}}$



$\cos^{-1}\left(\cos\left(-\frac{\pi}{7}\right)\right)$

what.....

1d

$\sec^{-1}(1)$

= angle whose secant is 1

= angle whose cosine is $\frac{1}{1}$

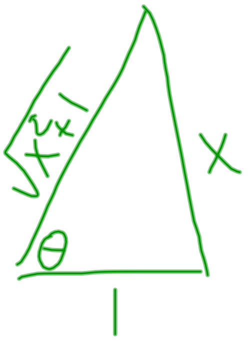
$= 0 \pm n\pi$

but inverse fns have restricted domains, so... just 0

12d) on 5

$$\sin(\tan^{-1}(x))$$

$\sin(\theta$ where all I know about θ is that $\tan\theta = x)$



$$\sin\theta = \frac{x}{\sqrt{x^2+1}}$$

5) $\tan\theta = \frac{4}{3}$

$\sin\theta = \frac{4}{5}$ $\quad$ $\csc\theta = \frac{5}{4}$

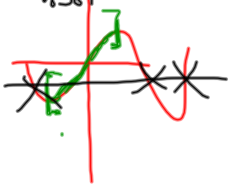
$\cos\theta = \frac{3}{5}$ $\quad$ $\sec\theta = \frac{5}{3}$

$\tan\theta = \frac{4}{3}$ $\quad$ $\cot\theta = \frac{3}{4}$

4.47 (a) $\sin^{-1}\left(\sin\left(\frac{\pi}{7}\right)\right) = \frac{\pi}{7}$

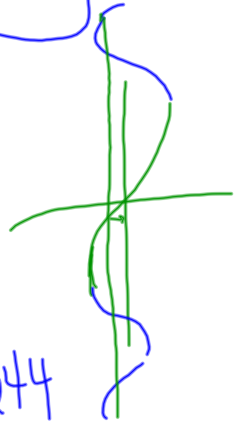
$[-\frac{\pi}{2}, \frac{\pi}{2}]$
angles
sin: $(-\infty, \infty)$ → sin ratio: $[-1, 1]$

-.14 / 1.14 / .141
-4, -3, -2, -1, 0, 1, 2, 3, 4
.8584 / -1 / 0 / 1 / 1.14 / -.75

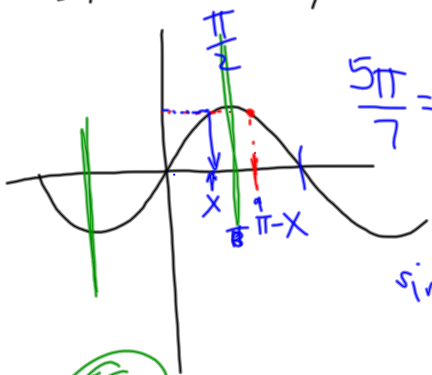


$\sin^{-1}$: ratios in $[-1, 1]$ → angles

$[-\frac{\pi}{2}, \frac{\pi}{2}]$



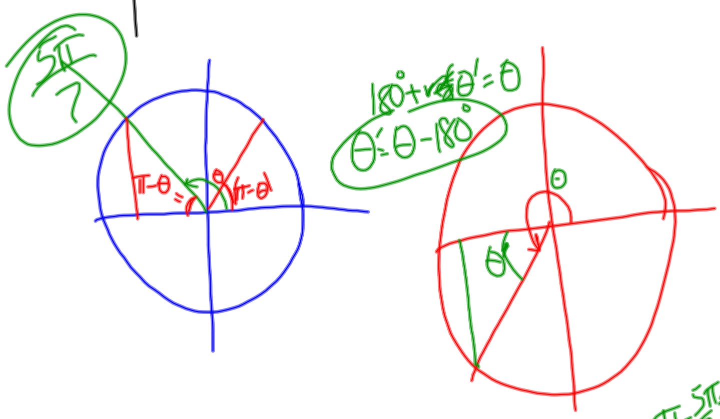
$\sin^{-1}\left(\sin\left(\frac{5\pi}{7}\right)\right)$



$\frac{5\pi}{7} = 2.244$

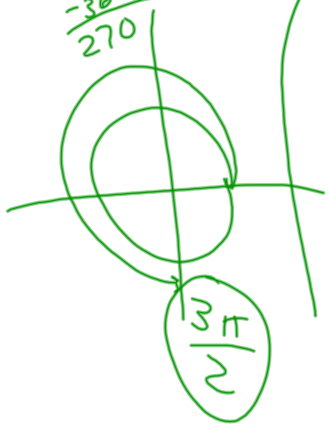
$\sin(2.244) = .782$

$\sin^{-1}(.782) \approx .898$



$\frac{\pi - 5\pi}{7} = \frac{2\pi}{7}$

630°
−360°
270°



$\sin^{-1}\left(\sin\left(\frac{5\pi}{7}\right)\right)$

sin of Q2: +

$\sin^{-1}(\text{pos}) \Rightarrow$ Q1

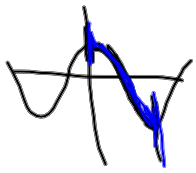
$= \frac{2\pi}{7}$

$\cos^{-1}\left(\cos\left(\frac{\pi}{7}\right)\right)$

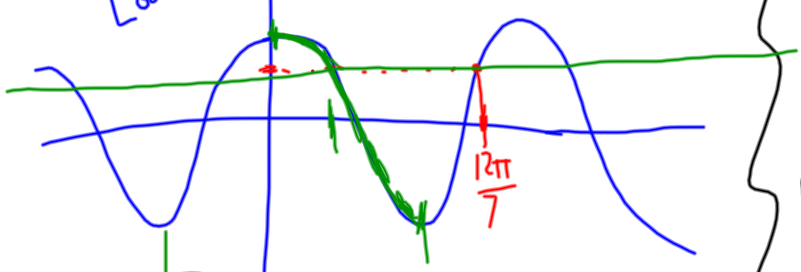
Thought

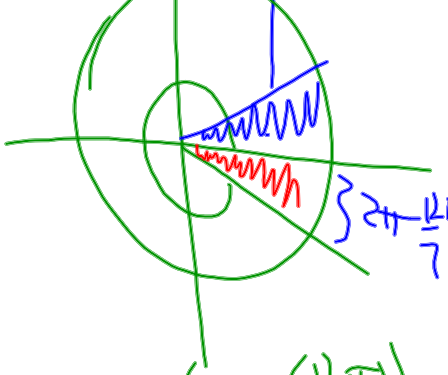
cos: $(-\infty,\infty) \to [-1,1]$

$\cos^{-1}$: $[-1,1] \to [0,\pi]$



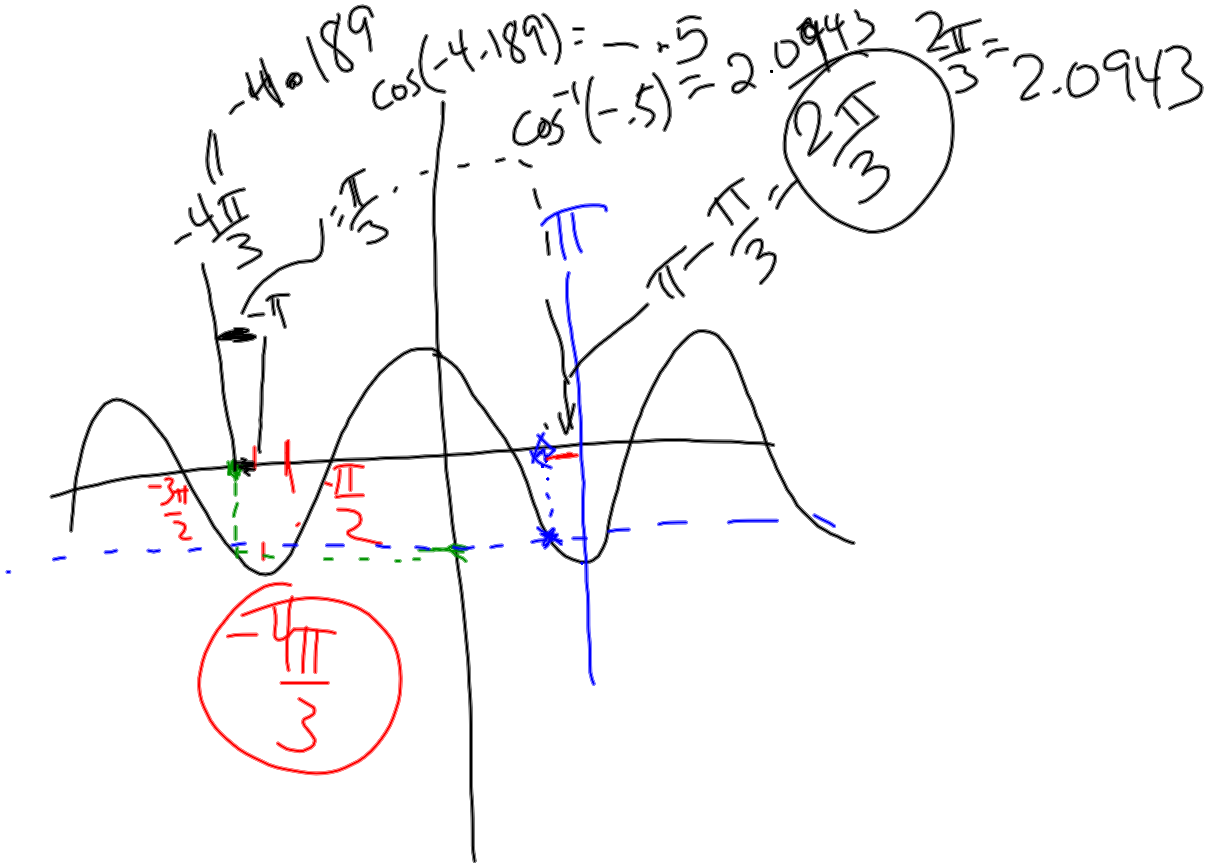
Look at $\frac{12\pi}{7}$





$2\pi - \frac{12\pi}{7} = \frac{14\pi}{7} - \frac{12\pi}{7} = \frac{2\pi}{7}$

$\cos^{-1}\left(\cos\left(\frac{12\pi}{7}\right)\right) = \frac{2\pi}{7}$


-4.189
cos(-4.189) = -.5
cos⁻¹(-.5) = 2.0943
2π/3 = 2.0943
-4π/3
π/3
-π
π
π - π/3 = 2π/3
-3π/2
-π/2
-4π/3

7d) $\sin^{-1}(\sin(630))$ $2\pi\overline{)630}$

$(630-200\pi)$ $100\cdot 2\pi$ $630 \div (2\pi)$

100.268

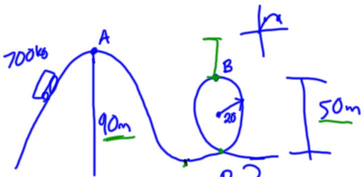
$= 1.68 > \frac{\pi}{2}$

$\pi-(630-200\pi) = 201\pi - 630$

$= +1.460 < \frac{\pi}{2}$

$\pi - 1.68$

$\pi - 1.68$



V_B at pt. B ?

$V_B = 28.3 m/s$

GPE + KE = KE

$mgh + \frac{1}{2}mv^2 = mgh_2 + \frac{1}{2}mv_2^2$

$(9.8)(90) = (9.8)(50) + \frac{1}{2}v^2$

$900 = 500 + \frac{1}{2}v^2$

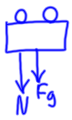
$400 = \frac{1}{2}v^2$

$800 = v^2$

$v = 28.3$

$\sqrt{800}$ $\sqrt{400}$

$\sqrt{8}$



$\Sigma F_c = \frac{mv^2}{r} = N + F_g$

$\frac{mv^2}{r} = mg + N$

$\frac{(700)(28^2)}{20} = 7000 + N$